X-RAY SOURCES OVERDENSITY AROUND 3C 295

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Abstract We present a statistical analysis of the Chandra observation of the source field around the 3C 295 galaxy cluster ($z = 0.46$). Three different methods of analysis, namely a chip by chip logN-logS, a two dimentional Kolmogorov-Smirnov (KS) test, and the angular correlation function (ACF) show a strong overdensity of sources in the North-East of the field, that may indicate a filament of the large scale structure of the Universe toward 3C 295.

1. Observation and Data Reduction

Chandra observed the $16' \times 16'$ field around the 3C 295 cluster with ACIS-I on May 18, 2001, for 92 ks. All the analysis has been performed separately in the $0.5-2$ keV (89 sources identified), in the $2-7$ keV (71 sources) and in the $0.5-7$ keV (121 sources, fig. 1a) bands. The counts in the three bands were converted in $0.5-2$ keV, $2-10$ keV and $0.5-10$ keV fluxes, respectively.

2. Main Results

The following results have been achieved:

3C 295 LogN-LogS is consistent with the CDFS LogN-LogS by Rosati et al. 2002 in both the soft and hard band. The 3C 295 LogN-LogS in the soft, hard and broad bands computed separately for each ACIS-I chip show an overdensity of sources in the North-East (NE) chip (fig. 1b) which reflects the clustering of sources clearly visible in fig. 1. The discrepancy between the normalization of the LogN-LogS for the NE and SW chip is 3.2σ, 3.3σ and 4.0σ in the soft, hard and broad band, respectively (fig. 2a).

The two dimensional KS test shows the probability that the 3C 295 sources are uniformly distributed is only $\sim 3\%$ in the soft and hard bands, and drops below 1% in the broad band.

The ACF shows a strong signal on scales of a few arcmins ($\sim$ half a chip length), and also on lower scales in the $0.5-7$ keV band (fig. 2b).

More details on the present work can be found in D'Elia et al., A&A, submitted.

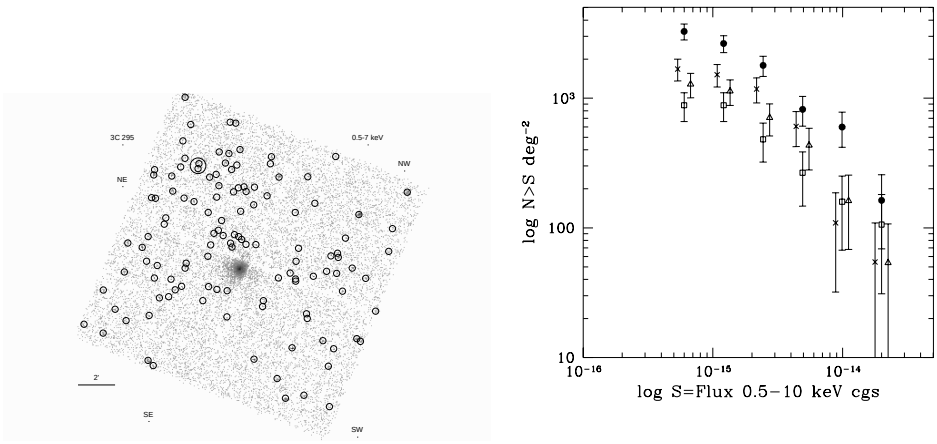

Figure 1. Left: the Chandra 3C 295 field in the $0.5-7$ keV band. Circles represent the sources detected; the brightest source in the center of the field is the cluster of galaxies 3C 295. Right: the mean (whole field) 3C 295 logN-logS in the $0.5-10$ keV band, calculated for each ACIS-I chip separately. Filled circles: NE chip, open triangles: NW, open squares: SE, crosses: SE. Errors represent 1σ confidence limit.

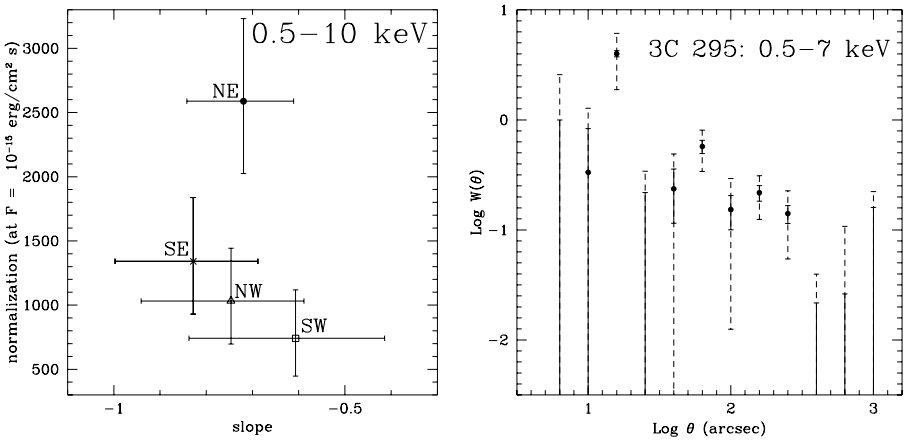

Figure 2. Left: results of the power law fits to the four logN-logS chips in the $0.5-10$ keV band. Symbols refer to chips as in fig. 1b. Errors are the 90% confidence limit. Right: the 3C 295 ACF in the $0.5-7$ keV band. Solid error bars are Poisson; dashed error bars are bootstrap.

References

. Rosati et al., 2002, ApJ, 566, 667